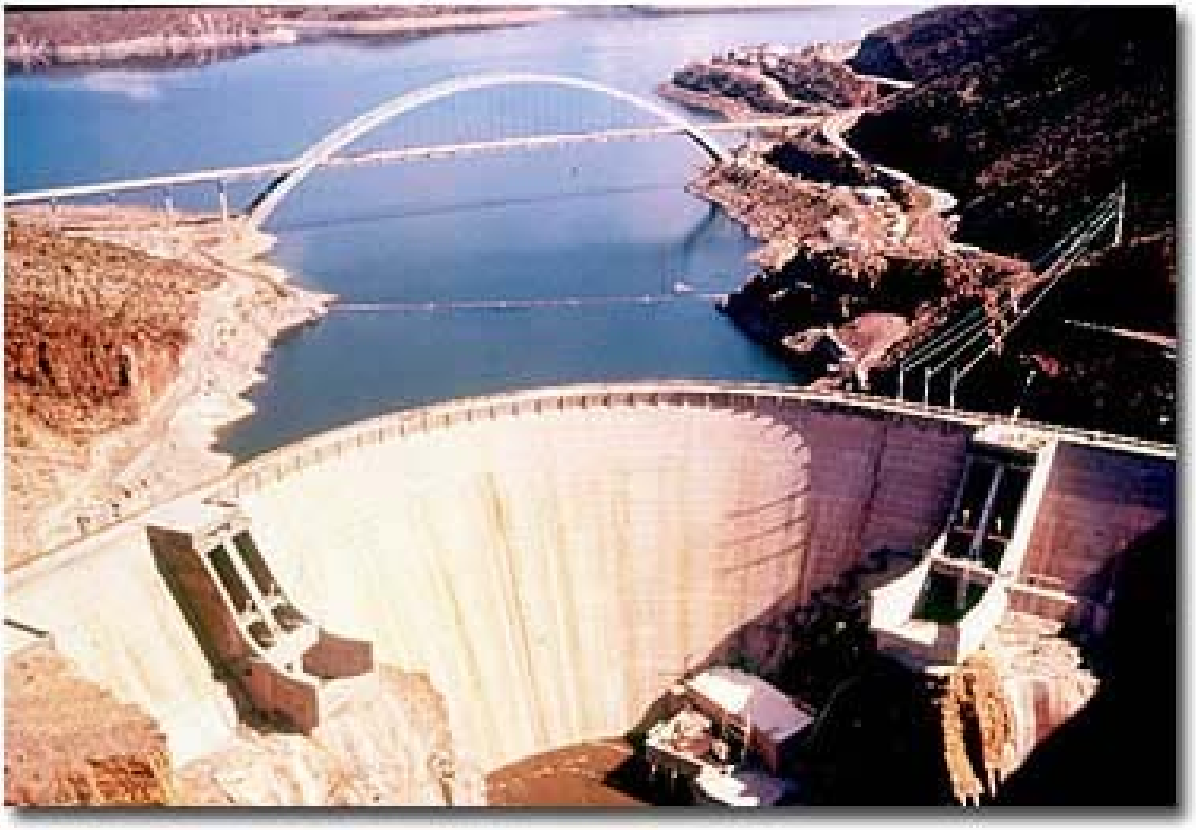

Tempe Water Utilities Department
September 2004

Drought Plan for the Tempe Water Service Area

Drought Plan for the Tempe Water Service Area
September 2004

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City of Tempe Water Utilities Department

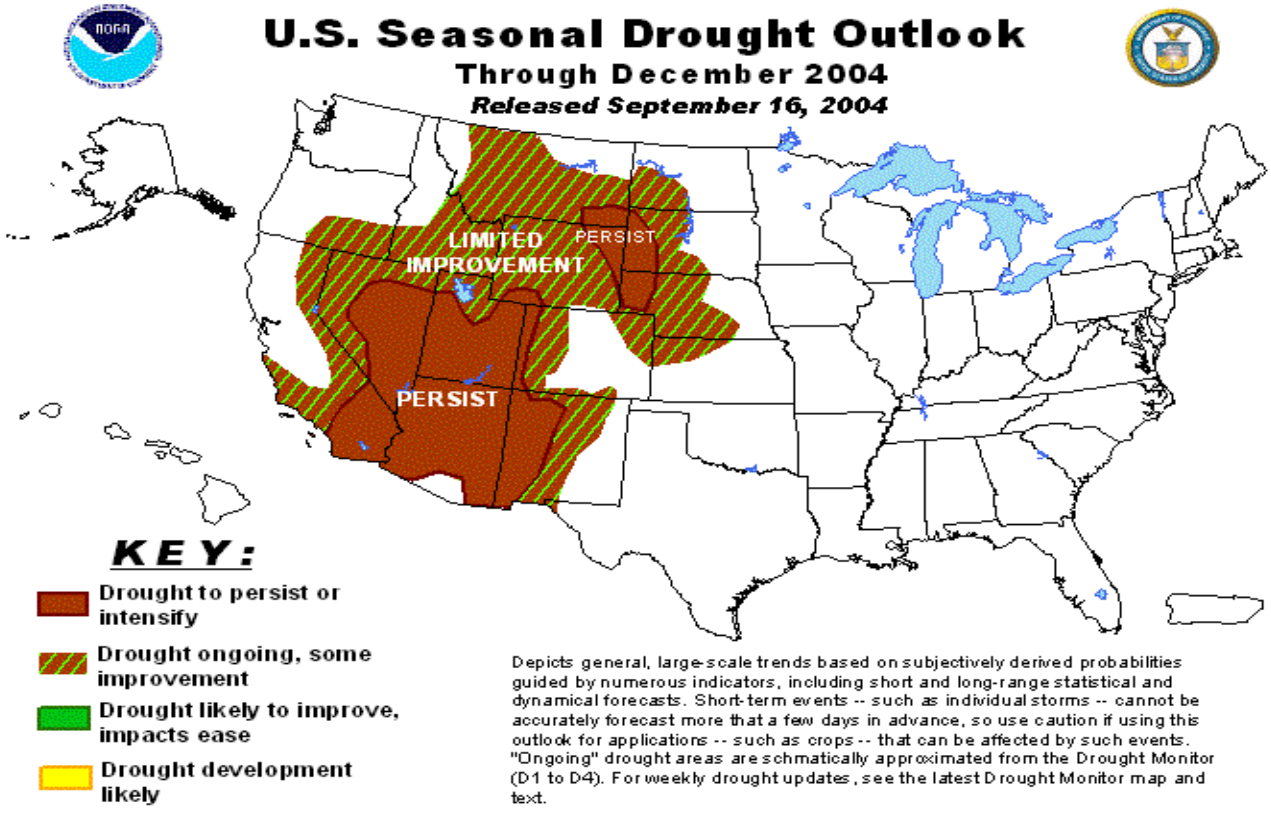
Drought Planning Update and Water Management Strategies
September 2004

I. INTRODUCTION

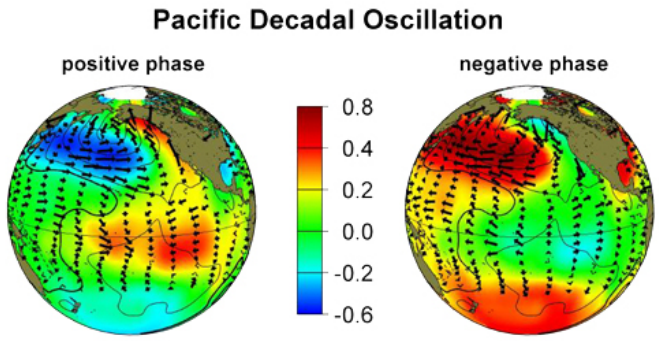
Tempe Surface Water Supplies and Drought Cycles in the Western U.S.

The City of Tempe uses renewable surface water resources for 95% to 99% of our total municipal water supply in an average year. An understanding of climate variability and cycles of drought is important for long term water resources planning.

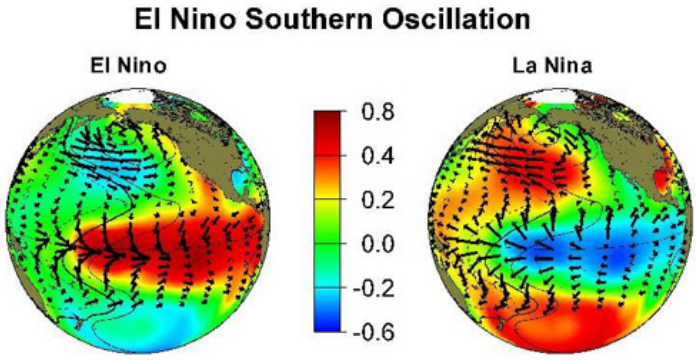
The State of Arizona, and much of the western United States, is experiencing one of the most significant periods of drought in recent history. In Arizona, we may be entering the ninth year of a well defined drought cycle. Since 1996, the Salt and Verde River watersheds have had only one year with above average winter precipitation and runoff (1997/1998). In seven out of nine years over this period winter precipitation and runoff has been below average. 2002 was the driest year on the Salt and Verde River watersheds since rainfall and stream flow records have been recorded. The Colorado River watershed may be entering its sixth consecutive drought year.



There have been many advances in atmospheric sciences and climate data gathering technology over the past two decades. Scientists now have a clearer understanding of the global oceanic circulation patterns that affect weather over the western United States. Two climate factors strongly influence weather in Arizona: The Pacific Decadal Oscillation (PDO) and the El Nino Southern Oscillation (ENSO).

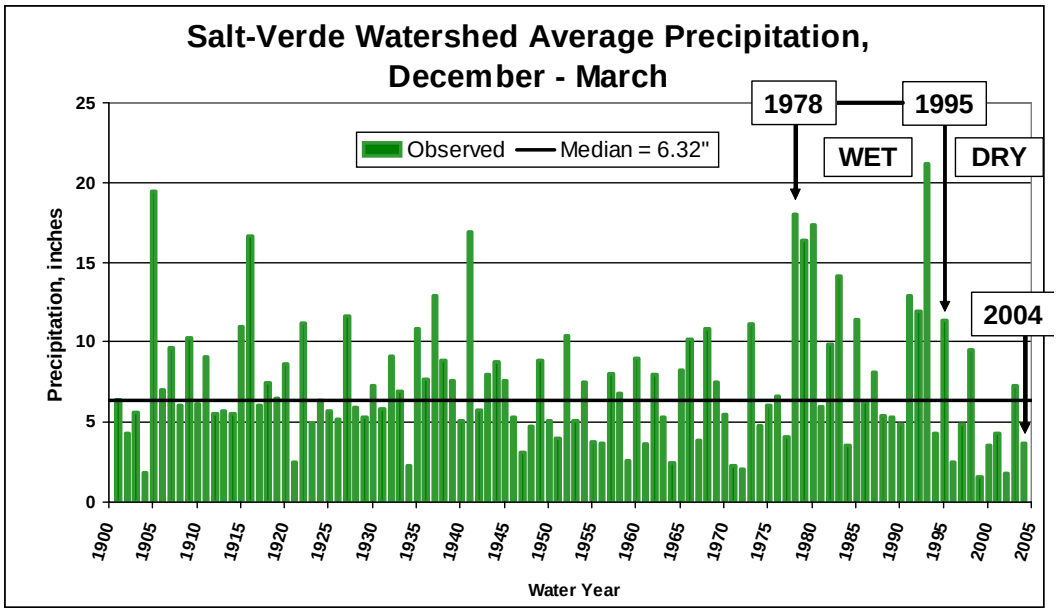


The PDO is a decades-long trend in Pacific Ocean temperatures that influence oceanic circulation patterns and weather systems. The warm (positive) phase of the PDO generally correlates with wetter periods in Arizona, while the cool (negative) phase corresponds with drier conditions and periods of drought. The last warm phase of the PDO occurred from the mid 1970's until 1996, a period of above average rainfall and runoff in Arizona, including several years with record flooding. By 1996, records now indicate, a cool phase of the PDO began to develop, corresponding with our recent drought conditions.



The ENSO, or El Nino, is a short-term warming of waters in the Eastern Pacific that generally means more frequent and intense winter storms and wetter weather for Southern California and Arizona. El Nino's that occur during a cool phase of the PDO are usually weaker and shorter in duration, such as the 1997/98 El Nino winter. El Nino conditions are reported to be returning to the Eastern Pacific this fall. El Nino's conditions that occur during a warm phase of the PDO can produce significant rainfall in Southern California and Arizona, such as the 1983/1984 and 1992/1993 El Nino periods.

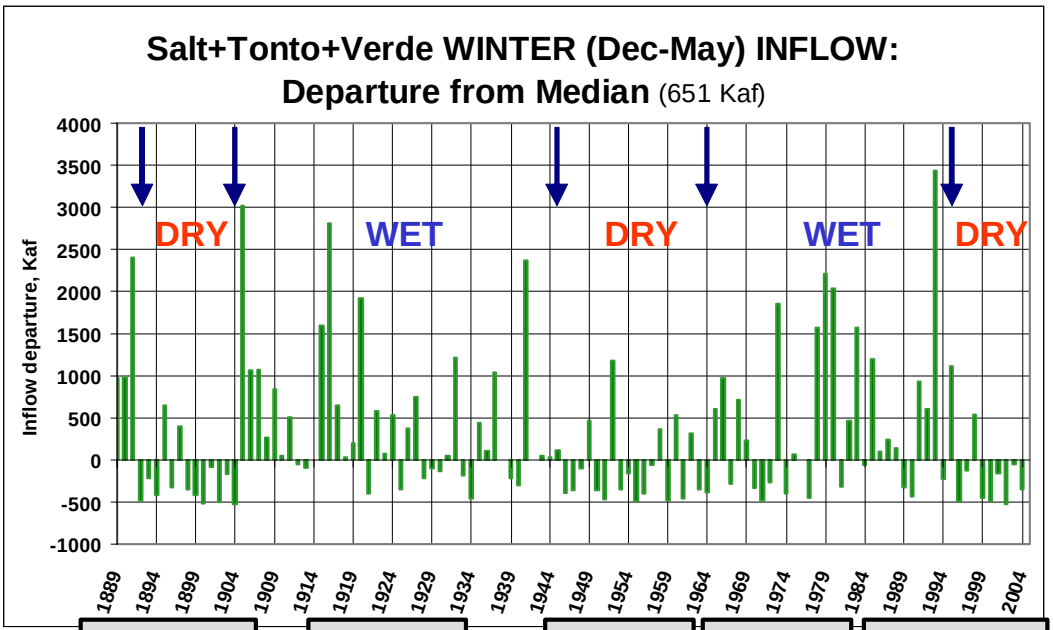
Analysis of climate, precipitation, and stream flow records over the past century have shown fairly consistent 20 to 30 year cycles of relatively wet periods followed by dry periods or drought. Reconstructed stream flow records from tree rings show this same wet/dry pattern occurring back to about 600 A.D. While there is some regularity to these climate cycles, the record also shows variability with respect to the severity of a drought cycle, or the frequency of wet years during a wet cycle.



2004: 3.70”

Below normal precipitation **7** of the last **9** winters.

2003: 7.33”	2000: 3.54”	1997: 4.87”
2002: 1.79”	1999: 1.52”	1996: 2.52”
2001: 4.30”	1998: 9.52”	1995: 11.38”

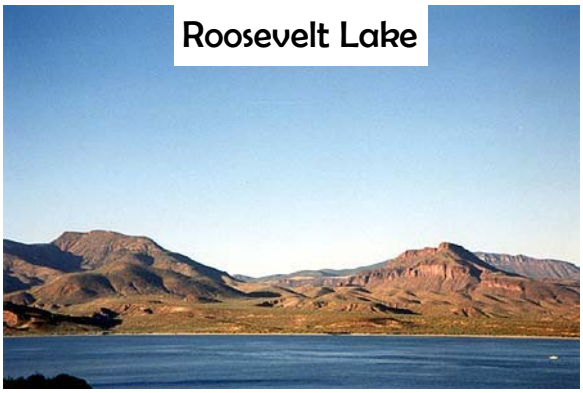


1892-1904:	1905-45:	1946-64:	1965-95:	1996-2004:
2 wet,	**27** wet,	5 wet,	**19** wet,	1 wet,
10 dry	14 dry	**14** dry	12 dry	**8** dry

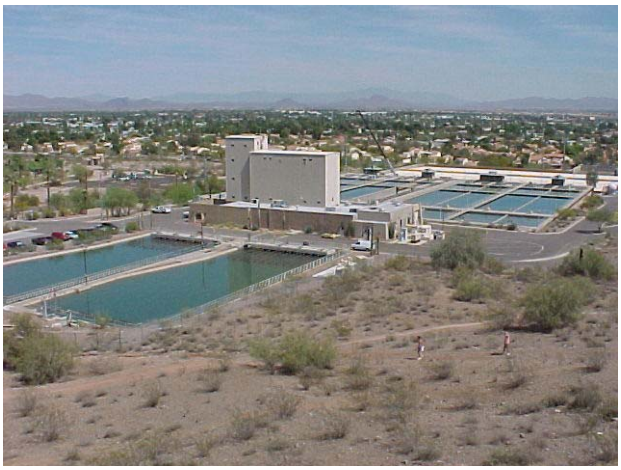
SRP Water Resource Operations: jas 06/2004

The drought cycle in Arizona may persist another decade or longer, or it may ease in the coming years. Our water resources and drought planning efforts will provide for all of our water supply needs under either scenario. The City of Tempe is fortunate to have a diverse water resources portfolio to carry us through periods of drought, but we must use all of our water resources wisely.

II. TEMPE WATER UTILITIES DEPARTMENT DROUGHT PLAN
Water Resources Background


Roosevelt Lake

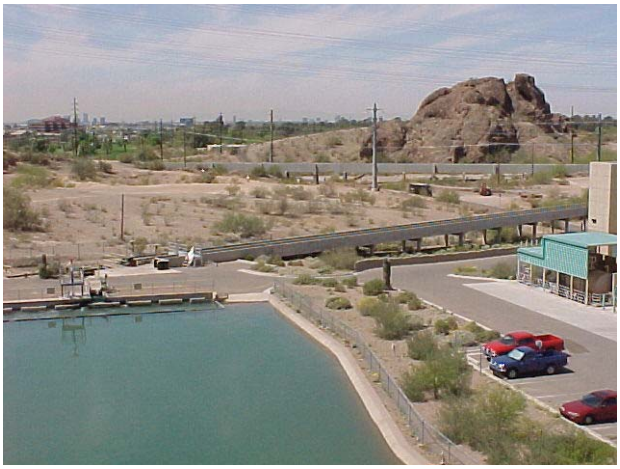
Tempe has long followed a water resource planning philosophy of utilizing renewable water resources for our municipal water demands and reserving our groundwater supplies for use during drought cycles, consistent with the intent of the 1980 Arizona Groundwater Management Act. Beginning in the 1960s, with construction of the Papago Park (now the Johnny G. Martinez) Water Treatment Plant, Tempe has utilized renewable surface supplies for nearly all of our water needs each year. After the South Tempe Water Treatment Plant was completed in 1982, Tempe's switch to renewable surface water supplies was complete. Groundwater supplies could be conserved for the future in the event drought conditions reduced the availability of surface water supplies.


Tempe Johnny G. Martinez WTP


South Tempe WTP

In the 1980s and 1990s, Tempe pumped very little groundwater for municipal water use. During these decades groundwater levels in the Tempe area rose significantly, nearly 100 feet in some areas compared to levels in the late 1950s to mid-1970s. Two factors that influenced this groundwater recovery were the 1980 Groundwater Management Act, regulating the use of groundwater, and the completion of the Central Arizona Project, bringing Colorado River water to central Arizona. Unlike some groundwater basins in central Arizona, the groundwater aquifer in Tempe is not being over-drafted due to the use of renewable water supplies by Tempe and many of our neighboring communities.

Decades of planning and investment in surface water treatment infrastructure and reclaimed water infrastructure by the City have helped conserve our groundwater resources for the future, for times of drought. Tempe has also been proactive in replenishing the East Salt River Valley aquifer system by recharging the groundwater table with excess surface water and reclaimed water.



Flume to Johnny G. Martinez WTP

Granite Reef Recharge Project

Tempe Well #12

Tempe and our surrounding East Valley communities have access to an extensive groundwater aquifer that is used primarily for drought supply by Tempe, the Salt River Project and our neighboring communities. Working together with our principal water supply agencies, the Salt River Project and Central Arizona Project, our communities will have more than adequate groundwater resources and access to underground storage projects to supplement any current and future surface water shortages. Increasing the direct reuse of reclaimed water for non-potable uses and recharge for aquifer storage also furthers our goal of supplementing surface water supplies in times of shortage.

Tempe Kyrene Water Reclamation Facility

III. TEMPE DROUGHT PLAN – Stage 1 (Drought Advisory)

The Tempe Water Utilities Department prepared a report outlining Tempe's drought planning and water management strategy in August, 2002. The report expanded on the drought planning efforts outlined in Tempe's 1997 and 2002 Water Resources Plans. The key elements of the drought plan were first discussed with the Tempe City Council at a Work Study session in August, 2002, and presented as recommendations for approval at a Tempe City Council Issue Review Session in September, 2002. The Tempe City Council directed the Water Utilities Department to proceed with the drought mitigation measures outlined in the report.

The drought plan has been updated with results from 2003 and recommendations for Stage 2 of the Drought Plan, to be implemented if needed in the future. The Tempe Water Utilities Department is proposing the City Council adopt an expanded drought plan to assist our utility in managing continued drought conditions on the Salt/Verde and Colorado River watersheds, and the resulting surface water supply shortages.

Drought planning efforts are focused on two areas: water demand reduction strategies and water supply augmentation.

In 2003 significant water savings were achieved by implementing drought mitigation measures specified in the plan (*compared to 2002*):

- 13.1% reduction in SRP irrigation water use at Tempe city parks
- 15.4% reduction in SRP residential flood irrigation water use in Tempe
- 13.1% reduction in irrigation water use at the Tempe Ken McDonald Golf Course
- No winter grass overseeding at Tempe city parks or city facilities, except at golf courses
- 9.6% reduction in single family residential water use for the three-month fall period in 2003, reflecting savings from a voluntary program to encourage water customers to eliminate winter lawn overseeding
- 4.7% reduction in total water use in Tempe in 2003

Stage 1 Drought Plan Components

Water demand reduction strategies

- **Reduce SRP irrigation water use at Tempe city parks and athletic fields by 15%* in 2003, and maintain that level of water savings in 2004 and 2005**

2003 Results:

- 17 Tempe city parks and athletic fields receive direct SRP irrigation water deliveries. Water use in 2003 at these facilities was down 13.1% compared to 2002 (*776.30 acre-feet vs. 892.49 acre-feet, a savings of 116.19 acre-feet*), just short of the 15% target for SRP irrigation water use savings at city parks.

- **Reduce residential flood irrigation water use by 11%* in 2003 (reduce irrigation runs from 18 to 16), and maintain that schedule and level of water savings in 2004 and 2005**

2003 Results:

- Tempe Water Utilities Department Irrigators deliver SRP irrigation water to over 900 residential accounts in Tempe. In 2003 the normal schedule of 18 irrigation runs per year was reduced to 16 irrigation runs, similar to the SRP policy for individual residential flood irrigation customers in other cities. Water use at these accounts in 2003 was down 15.4% compared to 2002 (*1770.89 acre-feet vs. 2092.68 acre-feet, a savings of 321.79 acre-feet*), exceeding the 11% target for SRP residential flood irrigation water use savings.

** - **Note**: Many of these Tempe city parks and Tempe residential flood irrigation accounts also hold senior priority Salt River water rights that predate the SRP reservoir system, in addition to rights to SRP stored water and SRP groundwater allocated by the SRP Board.*

❖ **Reduce Tempe municipal golf course irrigation water use by 10% in 2003, and maintain that level of water savings in 2004 and 2005**

2003 Results:

- Total irrigation water use at the Tempe Ken McDonald Golf Course in 2002 was 699.83 acre-feet. Total irrigation water use at the course in 2003 was approximately 608.14 acre-feet, down 13.1% compared to 2002. Water use data for the Tempe Rolling Hills Golf Course in 2002 is incomplete due to a billing system error, but the course reduced the amount of acreage over-seeded in late 2003. Total irrigation water use at Rolling Hills Golf Course in 2003 was 359.14 acre-feet. The total water savings at the Ken McDonald Golf Course in 2003 exceeded the 10% target for water use reduction at the course.

❖ **No winter grass overseeding at Tempe city parks or city facilities**

2003 Results:

- No winter grass overseeding occurred at city parks or city facilities in 2002 and 2003, except at municipal golf courses, which reduced the amount of acreage overseeded in 2003.

❖ **Voluntary program to encourage homeowners and businesses to eliminate winter grass overseeding**

2003 Results:

- September through November is the usual time period when most winter grass overseeding occurs. Single family residential water use in September, October, and November, 2003 was down 9.6% compared to the same three month period in 2002 (*4,751.11 acre-feet vs. 5,254.57 acre-feet, a savings of 503.46 acre-feet*). It is uncertain how much of these savings are directly attributable to homeowners that have decided not to overseed this year; some of the reduction may be normal variability in demand due to weather conditions. The Tempe Water Conservation Office received a significant number of inquiries from water customers asking about the program after it was advertised much earlier and more extensively in 2003.

❖ **Increase public information campaign for Tempe Water Conservation Office programs: educational materials, classes, grants, rebates, ordinances, school programs, etc.**

- Landscape conversion rebates – Residents are eligible for a $250 rebate if they convert a whole front or back yard from grass to a low water use xeriscape design, or a $500 rebate if both the front and yards are converted to xeriscape.
- Toilet replacement rebates – Residents are eligible for rebate up to $75 if they replace an old, high water use toilet fixture with a standard low water use model.
- Plumbing retrofit kits
- Self water audit kits
- Free xeriscape design and low water use plant classes are conducted several times a year by the Tempe Water Conservation Program.
- Free irrigation system installation and maintenance classes are conducted several times a year by the Tempe Water Conservation Program.

❖ **Increase public information campaign for Tempe Water Conservation Office programs: educational materials, classes, grants, rebates, ordinances, school programs, cont.**

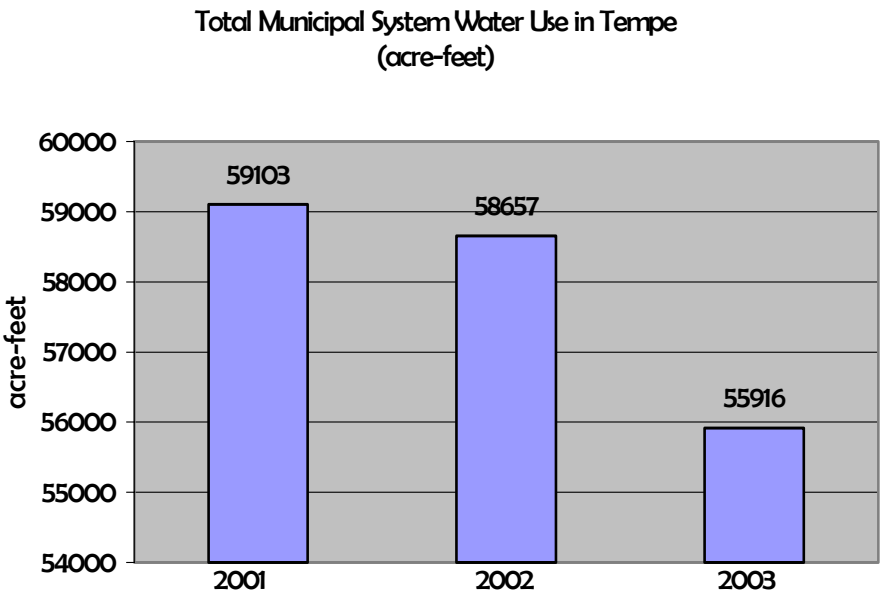
- Industrial/Commercial Water Conservation Grant Program – The Tempe Water Utilities Department budgets $100,000 each year for an industrial/commercial water conservation grant program. Industries or businesses that can demonstrate sustainable reductions in overall water use by more than 15% are eligible to apply for these grant funds. The savings can be achieved through any combination of measures that will reduce water consumption by over 15%. Examples include installation of water recovery or recirculation systems, improvements in industrial water process design, cooling tower redesign, large scale landscape conversions, etc… Grant applicants are eligible to receive 25% to 50% of the cost of the project, with a maximum grant award of $20,000.
- "Water – Use it Wisely" public information campaign, with other valley cities, AMWUA, SRP, and CAP.
- More frequent drought updates and water savings guidelines published in the Tempe Today newsletter sent out to all water customers in Tempe.
- Tempe ordinance prohibiting water wasting. Tempe has an ordinance prohibiting water wasting, defined as letting water from a broken irrigation system or other source run off from a property on to city sidewalks, streets or alleys. The problem is usually corrected when one of our Water Conservation staff contacts the property owner or manager. If not corrected, the property owner is sent a written warning, and could be fined if the problem continues.
- Tempe non-residential landscape ordinance. Tempe has an ordinance that limits the amount of grass or water intensive landscape that can be planted in new non-residential developments.
- Tempe non-residential development water conservation plan. New non-residential developments must submit a water conservation plan for each new development.

❖ **Increase public information campaign for Tempe Water Conservation Office programs: educational materials, classes, grants, rebates, ordinances, school programs, cont.**

- Tempe municipal water distribution system leak detection program. 10% to 20% of the water distribution mains, valves, and hydrants are scanned for leaks each year using high tech ultrasonic leak detection equipment.
- School Program - water conservation shows for Tempe schools.
- School gardening grant program – annually awards $5,000 to Tempe schools to teach students about plants and proper watering techniques.

The Tempe Water Conservation website provides water conservation information and tips on how residents can save water. Go to: www.tempe.gov/water/conserve.htm or www.wateruseitwisely.com

❖ **Reduction in total annual municipal system water use in Tempe**



2003 Results:

Total water use for the Tempe municipal system (all city water customers) in 2001 was 59,013 acre-feet. In 2002 total municipal system water use in Tempe was 58,657 acre-feet, a decrease of 0.7%. In 2003 total municipal system water use in Tempe was 55,916 acre-feet. Total municipal system water use in 2003 is down 4.7% compared to 2002. The target for 2004 and 2005 is to maintain the level of overall water use city-wide to 2003 levels, despite continued growth and development within the water service area.

❖ **Additional water saving measures to be considered for the Stage 1 Drought Plan**

- 10% Irrigation Water Use Reduction Target for all City Parks: Stage 1 drought planning measures targeted a 15% reduction in irrigation use for residential flood irrigation customers and Tempe city parks and athletic fields that use SRP irrigation water. The 15% reduction in water use served two purposes: 1.) reduce irrigation water use at these accounts in response to drought conditions, 2.) allows these accounts to remain within the limits of reduced SRP water allocation. Stage 1 also called for 10% reduction in irrigation water use at municipal golf courses.

Recommendation: The Water Utilities Department recommends a 10% water use reduction target for irrigated turf at all other city parks. Parks that are sprinkler irrigated using the municipal water system would be added to the Stage 1 Drought Plan water use reduction targets.

- Increase Rebate for Landscape Conversion to Xeriscape Design: The Tempe Water Utilities Department has an ongoing rebate program for residential water customers that are interested in converting their grass lawns to a low water use xeriscape landscape design. Homeowners that convert a front yard or back yard from grass to drought-tolerant, low water use plants are eligible to receive a $100 rebate after the xeriscape conversion project is completed.

Increase Rebate for Landscape Conversion to Xeriscape Design, cont.:

Recommendation: The Water Utilities Department recommends an increase in the xeriscape conversion cash rebate for residential or small business water customers in Tempe. The proposed xeriscape conversion rebate would increase to a $250 rebate for converting an entire front or back yard to a xeriscape landscape design, and a $500 rebate for converting both a front and back yard from turf to xersicape. Homeowners must present before and after photos documenting the turf removal and xeriscape conversion. The Water Utilities Department recommends a $20,000 increase in the fiscal year 2005/2006 budget for landscape conversion rebates (from $20,000 to $40,000 per year).

- Expand Residential Toilet Rebate Program to Multi-Family Residential Sector: The Tempe Water Utilities Department has an ongoing rebate program for single-family residential water customers in older homes that may still be outfitted with inefficient 3.5 or 5 gallon toilet fixtures. Homeowners that replace an older, high water use toilet with a low water use 1.6 gallon model are eligible for a rebate of 50% of the product cost, up to $75 per fixture.

Recommendation: The Water Utilities Department recommends expanding the low flow toilet rebate program to large scale applications in older multi-family residential units. There are many older apartment complexes or other multi-family units in Tempe that may still have older toilet and plumbing fixtures that could be converted to low water use models if the city is able to offer a rebate program tailored for large scale toilet conversions. Apartment owners and owners of multi-family properties would be eligible for a 50% rebate towards the cost of each older model toilet replaced, up to $75 per fixture, with a maximum rebate of $5,000 per multi-family property. The rebates are only available for units with older, high water use toilet fixtures certified to be non-compliant with the current low water use plumbing code. The Water Utilities Department recommends a $50,000 increase in the fiscal year 2005/2006 budget for expanding the toilet rebate program to multi-family residential units (from $20,000 to $70,000 per year).

- Sewer Fee Adjustments

Residential sewer charges are based on 90% of average water consumption reflected on January through March water bills. Beginning with the water bill for the month of May each year, sewer charges are based on current sewer rates and the updated volume based on that average winter consumption. This is a common strategy used by utilities valley-wide to estimate the volume component for sewer charges.

For customers that use significantly more than 10% of their water consumption over the winter months outside the residence for landscape use, a "sewer fee adjustment" may be requested. Typically, these adjustments are requested to eliminate the impact on sewer charges resulting from winter lawn irrigation. Sewer fee adjustments are also made when swimming pool maintenance or water leaks occur during the winter months.

The sewer fee adjustment process is not automated, and thus fairly labor intensive and expensive to support. It is also fairly subjective in nature, with adjustment requests that must be evaluated on an individual basis with respect to the average customer. Many multi-family residences (and a few single family residential customers) have addressed this issue by installing a separate water meter for landscape irrigation, eliminating the need for winter average based sewer charges.

Adjusting sewer charges to minimize the cost of maintaining a winter lawn does not encourage water conservation in the face of the ongoing drought. The permanent elimination of sewer fee adjustments based on winter landscape use may potentially encourage customers to conserve by not planting a winter lawn while the drought persists. This measure would also encourage installation of a separate meter by those customers who wish to continue using significant amounts of water during the winter months for landscape irrigation.

- Permanent Elimination of Landscape Based Sewer Fee Adjustments
    - Potential for water use reduction: Moderate.
    - Encourages customers to forego winter lawn over-seeding
    - **Recommendation**: Eliminate landscape based sewer-fee adjustments on a permanent basis.

IV. Key elements of water supply augmentation

- **Increase groundwater and recovery well production capacity for back-up water supply and supplemental drought supply**

Action Items:

- Two (2) new municipal production wells have been brought on-line since 2000. A third well has just been completed and will be brought on-line in 2005. *At least three additional municipal production wells are planned by FY 2008/2009.*
- Rehabilitation of older municipal wells to improve production, performance, and water quality. *Four (4) wells have had significant rehabilitation or modification upgrades in the past three years.*

- **Request approval of a drought groundwater pumping exemption from the Arizona Department of Water Resources (ADWR) pursuant to the Arizona Assured Water Supply Rules**

Action Items:

Due to a reduction in the SRP stored surface water allocation in 2003 and 2004, Tempe is eligible for a drought exemption for groundwater use in both years. Tempe requested approval from ADWR for a drought exemption for 8,622 acre-feet of municipal groundwater use in 2003 at the time our annual water use report was filed (SRP groundwater and groundwater from Tempe municipal wells).

- **Store excess CAP water or reclaimed water in groundwater aquifers for future recovery during surface water shortages**

Action Items:

- Over 92,000 acre-feet of CAP water and reclaimed water (predominantly CAP water) have been stored in groundwater aquifers by Tempe through direct or in-lieu recharge projects. Over 50,000 acre-feet have been stored since 1998. *Tempe plans to schedule delivery of 9,000 acre-feet of CAP incentive recharge water to be stored for future use by Tempe at the SRP Groundwater Savings Facility in 2005.*

❖ **Increase direct use and storage of reclaimed water supplies, and utilize reclaimed water exchange provisions to develop new water supplies**

Action Items:

- The Ken McDonald GC Groundwater Recharge Project was fully permitted in 2001, storing reclaimed water in the upper aquifer in addition to reclaimed water used for irrigation at course.
- The Water Utilities Department negotiated a reclaimed water exchange agreement with SRP to deliver reclaimed water to SRP Kyrene Generating Station. This exchange initially results in approximately 1,500 to 2,000 acre-feet of new exchange surface water supply per year when the SRP Kyrene Generating Station is in full operation. Provisions of the agreement provide for an increase in the water exchange rate in 2010.
- The Tempe Water Utilities Department plans to add new reclaimed water infrastructure to deliver additional reclaimed water supplies to new reuse sites, potentially including Kiwanis Park, the Tempe Town Lake and adjacent turf facilities such as Rolling Hills Golf Course and ASU's Karsten Golf Course. *The Tempe General Plan 2030 addresses these new uses of reclaimed water in the Water Element chapter and the Growth Element chapter. Tempe General Plan 2030 was adopted by the citizens of Tempe in the May, 2004 election.*

Kiwanis Park

ASU Karsten Golf Course

Tempe Town Lake

- **Increase direct municipal use of available excess CAP water supplies to partially offset reduction in SRP stored water allocation.**

Action Items:

- Total CAP water use in Tempe increased from 4,700 acre-feet in 2002 to approximately 10,000 acre-feet in 2003 and 2004 to partially offset a reduction in the SRP stored water allocation. *For 2005, Tempe's projected CAP water order is 10,000 acre-feet for direct use plus 9,000 acre-feet CAP incentive recharge water.*

V. TEMPE DROUGHT PLAN – STAGE 2 (DROUGHT ALERT) *PROPOSED*

The first stage of Tempe's Drought Plan, the "Drought Advisory Stage" was implemented in September 2002 in anticipation of action by the SRP Board to reduce the SRP shareholder land water allocation for 2003. The Drought Advisory Stage includes the targeted water use reduction measures and voluntary water use reduction measures outlined above. Stage 1, Drought Advisory, remains in effect for the balance of 2004 and in 2005.

Stage 2 is a "Drought Alert Stage". The Tempe Water Utilities Department is requesting the Tempe City Council adopt the components of this plan for Stage 2, to be implemented if needed in the future.

Stage 1 Drought Advisory conditions remain in effect for 2005. If the SRP Board of Directors vote in future years to reduce the SRP Shareholder land water allocation to a level of 1.5 acre-feet per acre for the following year (a 50% reduction from the normal SRP allocation), the Drought Plan recommendation is that a Stage 2 drought condition be declared by the Tempe City Council after consultation with the City Manager, Water Utilities Department Manager, and Water Utilities Department staff.

The SRP water allocation is currently at 2.0 acre-feet per acre for 2004 (a 33% reduction from the normal SRP allocation). The SRP Board of Directors has recently approved a 2.0 acre-feet per acre allocation again for 2005.

The Drought Plan recommendation also includes City Council consultation with the City Manager and Water Utilities Department about a Stage 2 drought declaration if prolonged drought conditions and low reservoir storage on the Colorado River result in a reduction of Tempe's CAP M & I subcontract water allocation by at least 50% (Tempe's CAP M & I subcontract water allocation is 4,315 acre-feet per year). A full CAP water entitlement of 1.5 million acre-feet for central and southern Arizona is forecast for 2005 by CAP staff, including excess CAP M & I and CAP recharge contract water categories.

Tempe Drought Plan Timeline:

- July/August 2002 – Completed Tempe Drought Plan – "Drought Advisory Stage 1"
- August 2002 – Discuss key elements of plan with Tempe City Council in Work Study Session
- September 2002 – Present plan to Tempe City Council at Issue Review Session. Council directs Tempe Water Utilities staff to proceed with components of the plan as presented.
- September 2002 - SRP Board reduces SRP water allocation for 2003
- September 2002 through December 2003 – Tempe implements and conducts operations pursuant to the Drought Advisory Stage 1 plan
- September 2003 – SRP Board carries over reduced water allocation into 2004
- 2004 & 2005– Tempe continues under Stage 1 – Drought Advisory conditions pursuant to the Tempe Drought Plan conditions

TEMPE DROUGHT PLAN – STAGE 2 COMPONENTS (*RECOMMENDATIONS)*

Severe drought conditions persisting in the Salt/Verde and Colorado River watersheds over the next several years have the potential to result in further reductions in SRP water allocations and/or a reduction in the availability of some categories of CAP water. An expanded Tempe Drought Plan, or Stage 2 – "Drought Alert" is being developed to provide tools to help our water customers assist us in saving water and reducing the amount of groundwater reserves we will rely upon.

The Water Utilities Department has drafted a Stage 2 list of potential water use restrictions, their potential for water savings, and a recommendation for adoption by the City Council. The combination of water use restrictions to be adopted is at the sole discretion of the Tempe City Council.

Potential Water Use Restrictions for Stage 2 – Drought Alert: (*Proposed List*)

- **No winter grass overseeding (both residential and non-residential)**
- Potential for water use reduction : H I G H – Proven effective with voluntary program, savings could be significant with mandatory program.
- **Recommendation:** Adopt restriction on winter grass overseeeding for Stage 2 of the Tempe Drought Plan.

- **Outdoor lawn watering with sprinklers between 8:00 PM and 6:00 AM only**
- Potential for water use reduction: MODERATE to HIGH – Currently recommended lawn watering schedule in most cities water conservation program watering guides, and a schedule currently followed by many residents and business owners. Improved efficiency: lawn watering during the hot, dry afternoon hours loses much water to evaporation, mandatory watering time restrictions may raise the level of awareness about the severity of the drought to the average water customer, follow-up enforcement or monitoring may be difficult and time-intensive.
- **Recommendation:** Adopt restriction on time of day lawn watering for Stage 2 of the Tempe Drought Plan. Applies to sprinkler irrigation only, not drip irrigation systems.

- **Odd/even day lawn watering schedules or limit lawn watering to twice a week**
- Potential for water use reduction: MODERATE to HIGH – Improved efficiency: mandatory watering day schedules may help reduce water consumption by those water customers that water their lawns every day during the hottest months, or those customers that tend to over water their landscape. Mandatory watering day schedule restrictions may raise the level of awareness about the severity of the drought to the average water customer, follow-up enforcement or monitoring may be difficult and time-intensive.
- **Recommendation:** Adopt restriction limiting lawn watering to odd/even day or twice per week schedule for Stage 2 of the Tempe Drought Plan.

Tempe Rolling Hills Golf Course

- **Limit winter grass overseeding at municipal golf courses unless reclaimed water is used (except for tees and greens)**
- Potential for water use reduction: MODERATE – Currently only the Ken McDonald GC can use reclaimed water, applies only to Rolling Hills GC at this time.
- **Recommendation:** Adopt over-seeding limits at Tempe Rolling Hills Golf Course for Stage 2 of the Tempe Drought Plan.

- **No washing of sidewalks, drives, or pavement, no misting systems, car washing only with a shut-off nozzle or at commercial car wash**
- Potential for water use reduction: LOW – Difficult to monitor and enforce, more effective as voluntary water conservation measures as currently described in Tempe water conservation brochures, website, and "Water – Use it Wisely" campaign.
- **Recommendation:** Continue these measures as **voluntary** water use reduction messages during Stage 2 of the Tempe Drought Plan.

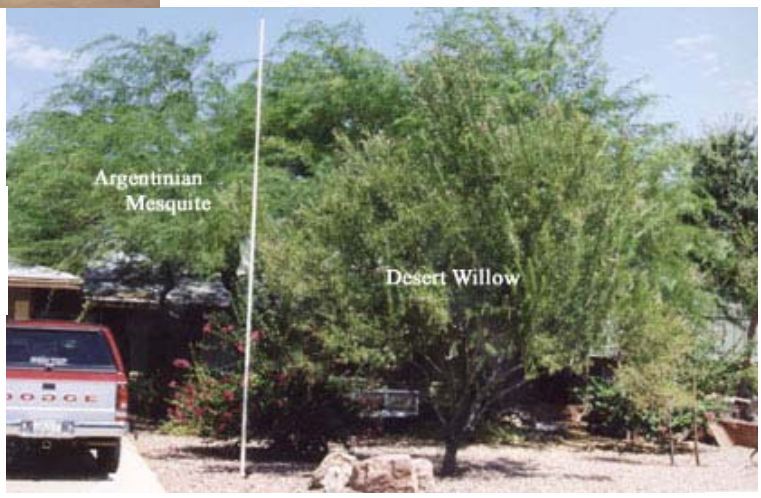
- **No decorative fountains**
- Potential for water use reduction: LOW to MODERATE – May serve as more of a symbolic water use reduction measure than a widely effective component of a drought plan.
- **Recommendation:** Ask for **voluntary** shut off for decorative commercial/non-residential fountains during Stage 2 of the Tempe Drought Plan.

Tempe residence before conversion to xeriscape

- **Increase rebates for residential turf removal and xeriscape landscape installation**
- Potential for water use reduction: MODERATE to HIGH– The landscape conversion rebate has been very popular with residential water customers over the past ten years. Raising the rebate payout to encourage additional conversions may stimulate a new round of residential turf removal.
- **Recommendation:** The Water Utilities Department is recommending that a program to increase rebates for landscape conversion be included in Stage 1 for 2005.

Tempe residence after conversion to xeriscape (1995)

Tempe residence with mature xeriscape landscape (August 2001)



- **Expand toilet rebate program to multi-family residential sector**
- Potential for water use reduction: MODERATE to HIGH – Expanding the toilet rebate program beyond the single-family residential sector to older multi-family residential properties has potential to replace a large number of older, inefficient toilet fixtures with new low water use models.
- **Recommendation:** The Water Utilities Department is recommending a toilet rebate program tailored to multi-family residential properties be included in Stage 1 for 2005.

- **Continue all other water use reduction measures and water supply augmentation projects identified under Stage 1 of the Tempe Drought Plan during Stage 2 Drought conditions**

This list of potential water use reduction measures and recommendations will be updated and amended in the future after further direction from the City Council.

VI. Drought Related Revenue Issues

When water consumption is reduced through either mandatory or voluntary conservation measures, a corresponding reduction in revenue invariably results. Conversely, operating expense typically increases, primarily due to the cost associated with developing alternative water supplies. Other drought related activities such as stepped-up conservation programs, conservation incentives, and public education and outreach also increase a utility's cost of operations. Any reduction in operating expense associated with lower production levels is typically negligible.

Increased drought related operating expense concurrent with reduced revenue has an obvious financial impact, and that is an operating deficit. The deficit may be offset by utilizing retained earnings (cash on hand), rate increases, or a combination of the two. Unfortunately, unreserved retained earnings in the water/wastewater fund are insufficient to insulate customers from drought related deficits for any more than a very short term basis. In fact, the utility's long range financial picture indicates that rate increases will be necessary for the next several years without the added impact of drought related operating deficits. Therefore, drought related revenue issues will almost certainly impact future rate increases.

In general, there are two types of drought surcharges. The first is a surcharge designed to not only address revenue deficits, but to also provide an additional incentive to a utility's customers to reduce consumption through a sharp increase in the price of water. The second type of drought surcharge is designed to close the operating deficit only. In both cases, the surcharge is usually considered a temporary measure, to be discontinued after the drought is over.

Neither type of drought surcharge will be recommended for consideration at this time. The first type of surcharge, which contains a rather punitive conservation incentive with sharply increased water rates, should only be implemented as a last resort when other conservation measures prove inadequate. The second type of surcharge is not recommended at this time due to its temporary nature.

Because rate increases are already anticipated for the utility, any drought related deficits can be addressed through normal cost of service rate adjustments. It must be recognized, however, that the resulting rate increases may be larger than would otherwise be considered to address drought impacts in addition to pre-existing revenue requirements. The advantage of this approach is that cost of service rates are maintained and, when drought impacts ease and more normal production and consumption resumes, future rate impacts may be reduced.

- Drought Surcharge with conservation incentive
  - Potential for water use reduction: Uncertain.
  - Recommendation: For discussion only

- Drought Surcharge without conservation incentive
  - Potential for water use reduction: Uncertain.
  - Recommendation: For discussion only

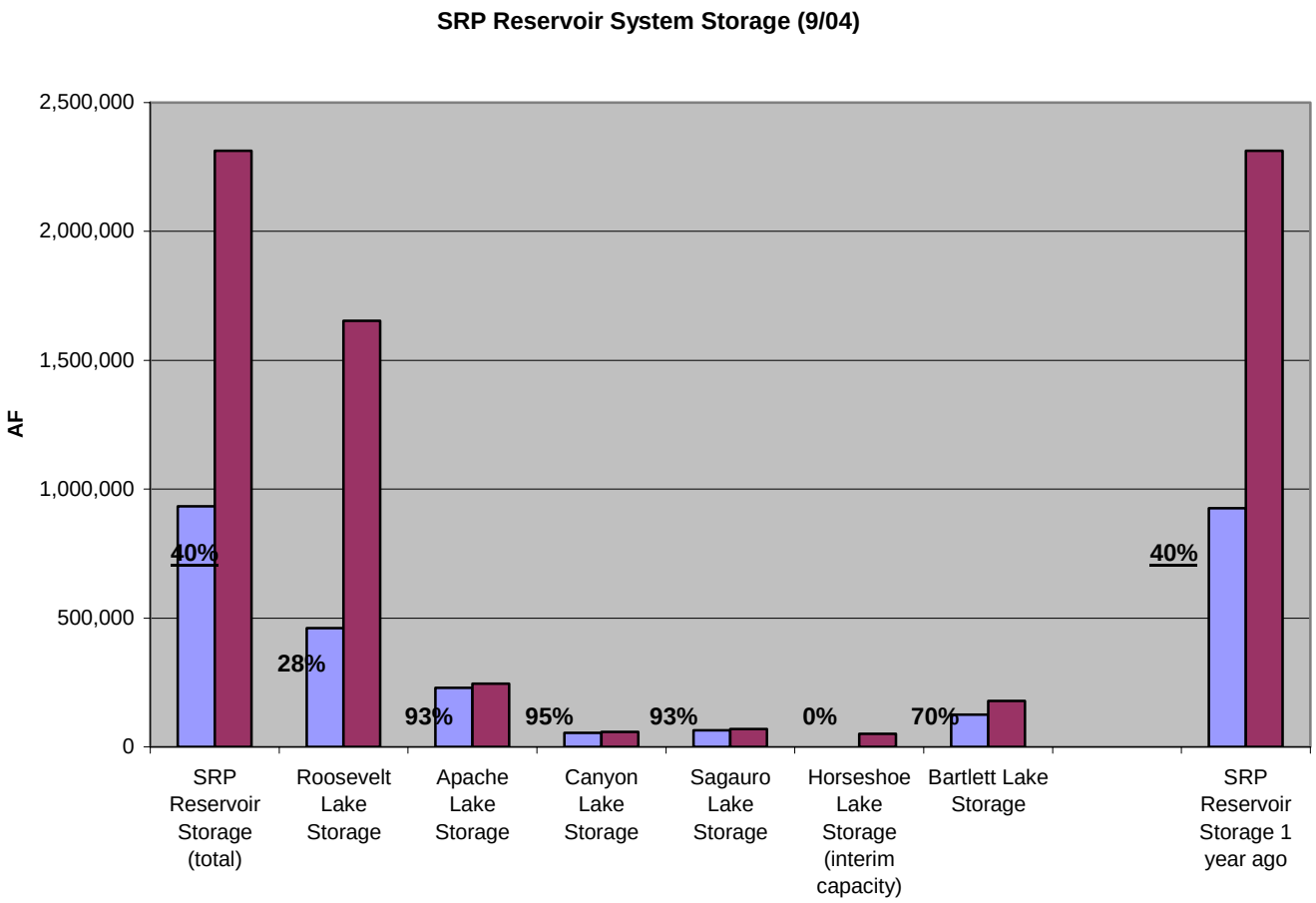
- Cost of Service Rates, including drought related revenue deficits when identified
  - Potential for water use reduction: Uncertain.
  - Recommendation: No recommendation required; Cost of Service Rates reflect current policy.

VII. Summary

The City of Tempe has a diverse portfolio of water resources to see our community through even extended periods of drought. Our water portfolio includes an ample quantity of groundwater resources that have been reserved specifically for use as a supplemental drought supply. The water use reduction measures outlined in this report are intended to be tools to help us manage our water resources wisely during periods of drought, with a minimum amount of impact to our water customers.

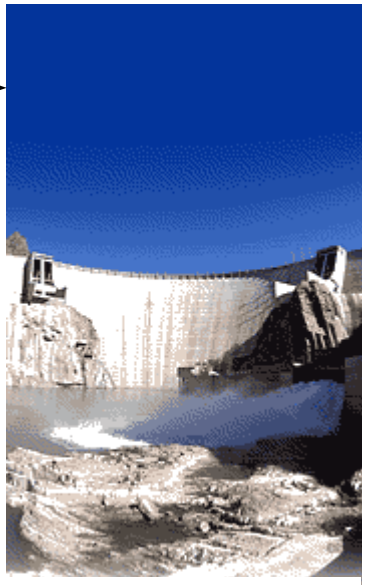
Appendix – Water Storage and Water Use Statistics

SRP Reservoir Storage (September 2004)



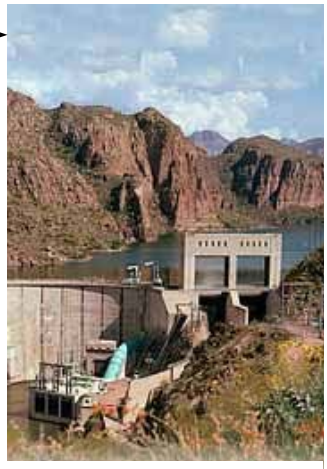
- Total SRP Reservoir System = 927,980 acre-feet (40%)
- Roosevelt Lake = 454,801 acre-feet (28%)
- Apache Lake = 229,146 acre-feet (93%)

Horse Mesa Dam



Roosevelt Dam

- Canyon Lake = 54,627 acre-feet (94%) →

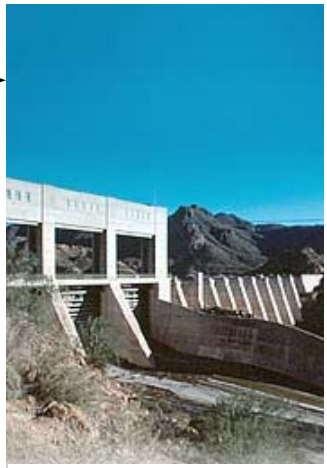


Mormon Flat Dam

- Saguaro Lake = 65,222 acre-feet (93%)

Stewart Mountain Dam

- Bartlett Lake = 124,184 acre-feet (70%) →

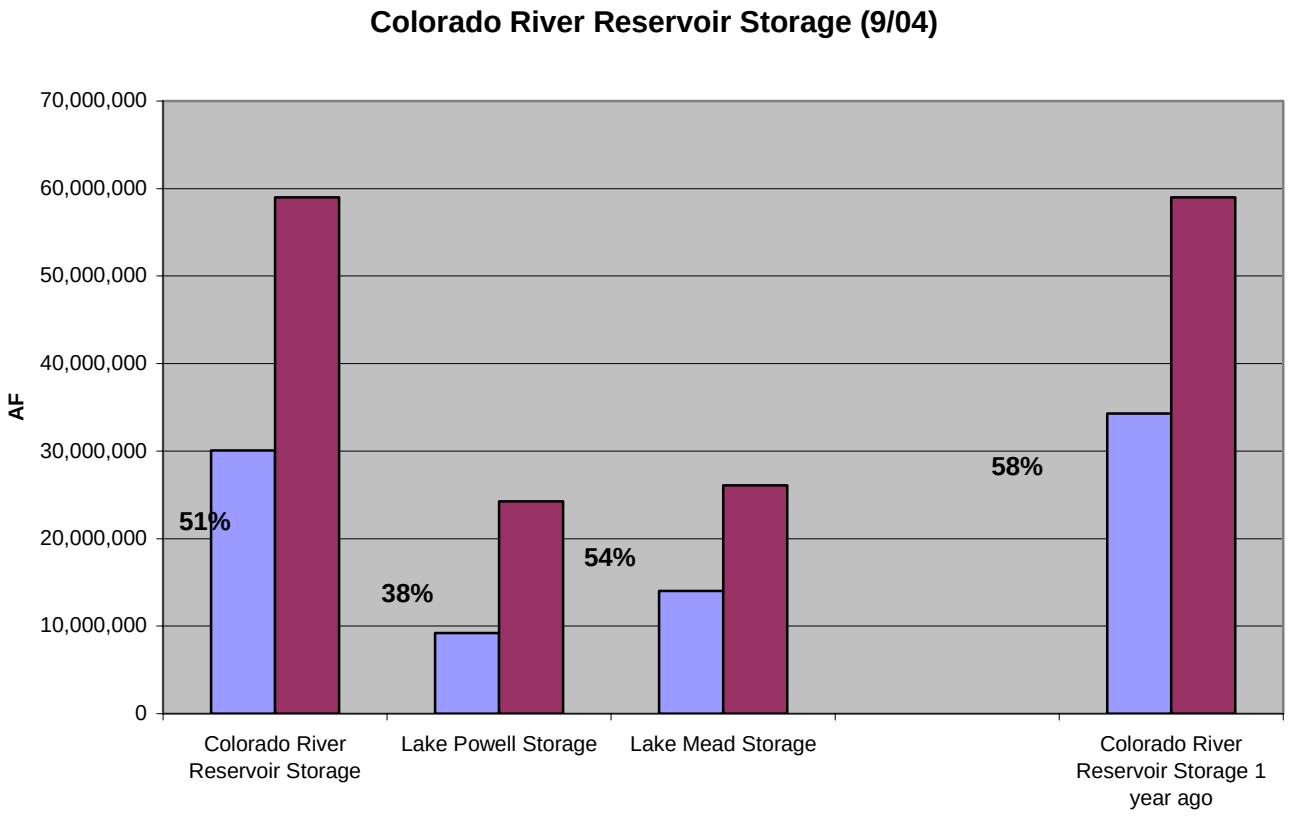


Bartlett Dam

- Horseshoe Lake = 0 acre-feet (0%)

Horseshoe Dam

Colorado River Reservoir Storage (September 2004)

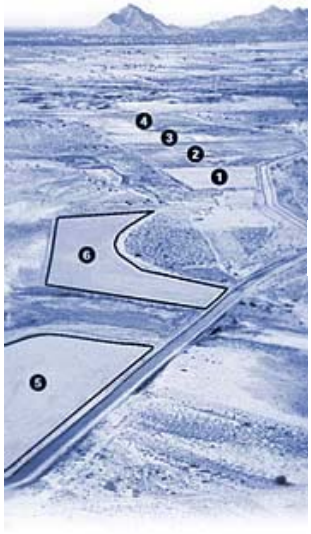


- Total Lower Colorado River Reservoir System = 29,977,000 acre-feet (50%)
- Lake Powell = 9,191,000 acre-feet (38%)

- Lake Mead = 13,985,000 acre-feet (54%)

Total Long-Term Aquifer Storage Credits Recharged by Tempe

- 92,000 acre-feet through 2004



Granite Reef Underground Storage Project

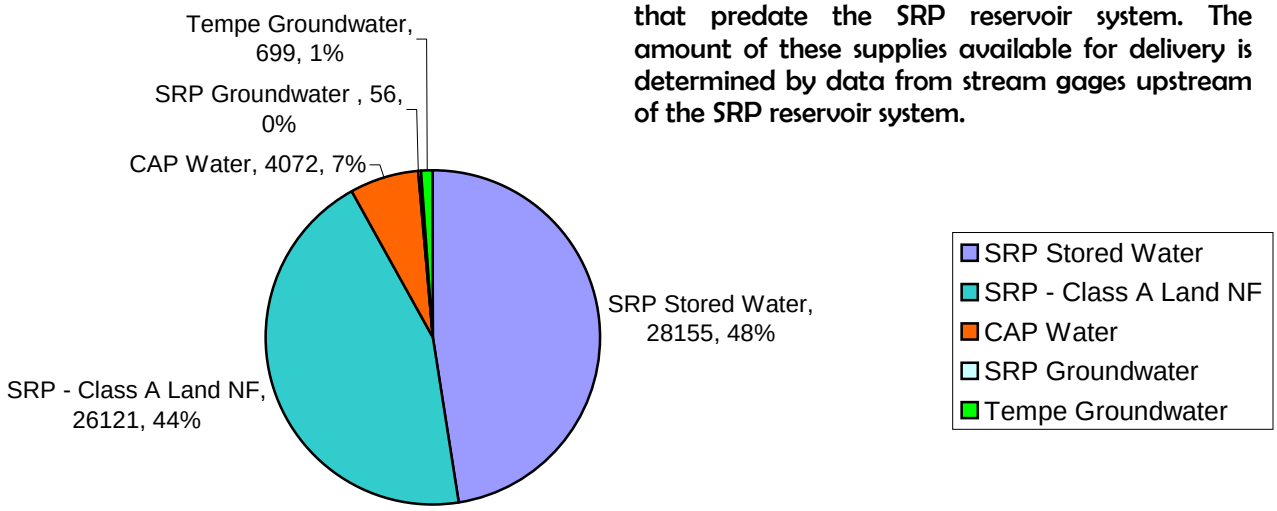
Units of Water Measurement: 1 acre-foot = 325,851 gallons

Total Municipal System Water Use in Tempe

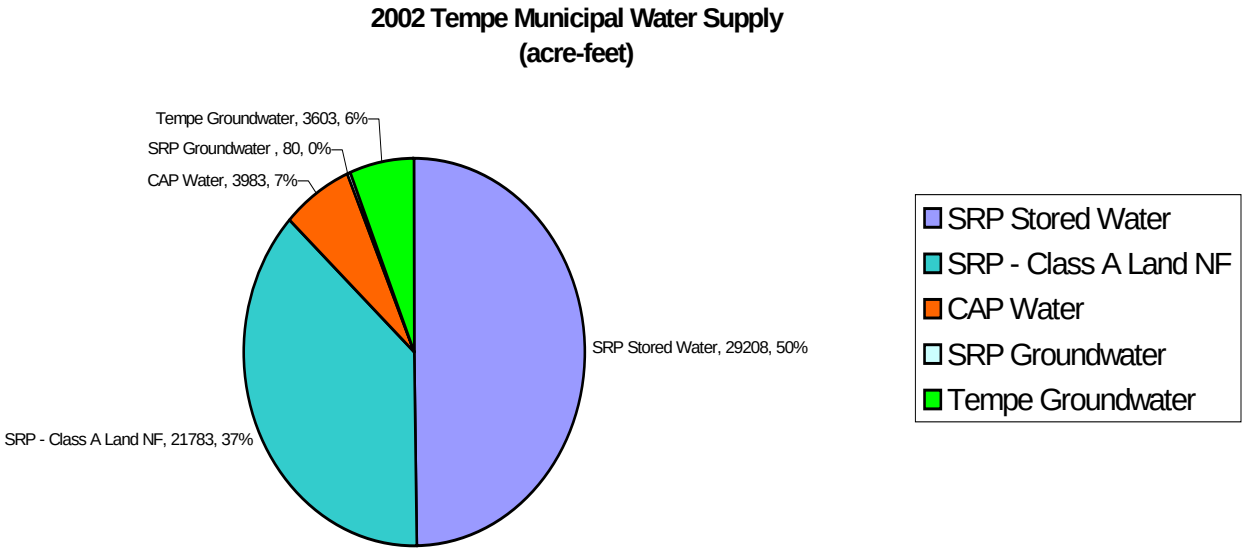
- 2001 = 59,103 acre-feet
  - 92% SRP surface water
  - 7% CAP surface water
  - 1% groundwater from Tempe municipal wells

2001 Tempe Municipal Water Supply (acre-feet)

Note on SRP water supplies: Class A Land Normal Flow water supplies are delivered to lands in Tempe pursuant to decreed senior water rights that predate the SRP reservoir system. The amount of these supplies available for delivery is determined by data from stream gages upstream of the SRP reservoir system.



- 2002 = 58,657 acre-feet
    - 87% SRP surface water
    - 7% CAP surface water
    - 6% groundwater from Tempe municipal wells



- 2003 = 55,916 acre-feet
    - 70% SRP surface water
    - 14% CAP surface water
    - 10% SRP groundwater
    - 6% groundwater from Tempe municipal wells